

What Is Claimed Is:

1. A method for measuring a three dimensional shape of a fine pattern formed on a substrate, comprising the steps of:
  - obtaining height information about the fine pattern by optically measuring the substrate;
  - obtaining electron beam image information about the fine pattern by imaging the substrate by means of an electron microscope; and
  - measuring the three dimensional shape of the fine pattern by use of the height information and the electron beam image information.
2. The method of claim 1, wherein a test pattern is formed on the substrate, and the height information about the fine pattern is obtained from height information about the test pattern determined by optically measuring the test pattern.
3. The method of claim 1, wherein the height information about the fine pattern is obtained from information from scatterometry.
4. The method of claim 1, wherein the electron beam image information about the fine pattern includes plane information about the fine pattern and side slope change information about the fine pattern, and a three dimensional shape of the fine pattern is measured by combining the plane information and side slope change information with the height information about the fine pattern.
5. The method of claim 1, wherein the electron beam image information about the fine pattern includes a plurality of electron beam

image information obtained by imaging the substrate by changing an incidence angle of an electron beam of the electron microscope to the substrate.

6. The method of claim 1, wherein the electron microscope comprises a plurality of reflected electron detectors, the electron beam image information about the fine pattern is information obtained from a plurality of electron beam images detected by a plurality of the reflected electron detectors.

7. The method of claim 6, wherein a three dimensional shape of the fine pattern is measured on the principle of photometric stereo by use of a plurality of the electron beam images detected by a plurality of the reflected electron detectors.

8. A method for measuring a three dimensional shape of a fine pattern formed on a substrate, the pattern being in a form of a thin film, comprising the steps of:

obtaining height information about a first pattern by measuring, using scatterometry, the first pattern repeatedly formed by a predetermined pitch;

obtaining electron beam image information about a second pattern by imaging, using an electron microscope, the second pattern formed on the substrate; and

measuring a three dimensional shape of the second pattern by use of the height information about the first pattern and the electron beam image information about the second pattern.

9. The method of claim 8, wherein a height of the second pattern is estimated from the height information about the first pattern, and the estimated height information about the second pattern and the electron beam image information about the second pattern are used to measure a three dimensional shape of the second pattern.

10. The method of claim 8, wherein the electron beam image information about the second pattern includes plane information about the second pattern and side slope change information about the fine pattern, the plane information and the side slope change information are combined to measure a three dimensional shape of the second pattern.

11. A method for measuring a three dimensional shape of a fine pattern formed on a substrate, comprising the steps of:

obtaining optical information about a fine pattern formed on the substrate by optically measuring the substrate;

obtaining a plurality of electron beam image information about the fine pattern formed on the substrate by imaging the substrate by means of an electron microscope;

measuring a three dimensional shape of the fine pattern by use of the obtained optical information about the fine pattern and a plurality of the obtained electron beam image information; and

displaying, on a screen, information about the measured three dimensional shape of the fine pattern and a plurality of electron beam image of the fine pattern.

12. The method of claim 11, wherein a waveform of the combination of a plurality of scanning line signals of one of a plurality of the electron beam images of the fine pattern is displayed on the screen.

13. The method of claim 11, wherein the information obtained by optically measuring the substrate is information obtained by measuring a test pattern formed on the substrate by means of scatterometry.

14. The method of claim 11, wherein the electron beam image information obtained by imaging the substrate by means of the electron microscope is information obtained from a plurality of electron beam images imaged by changing an incidence angle of an electron beam of the electron microscope to the substrate.

15. The method of claim 11, wherein the electron beam image information obtained by imaging the substrate by means of the electron microscope is information obtained from a plurality of electron beam images detected by a plurality of reflected electron detectors equipped in the electron microscope.